

EFFICACY OF PROBLEM BASED LEARNING (PBL) OVER LECTURE METHOD IN ENHANCING THE CRITICAL THINKING SKILLS AND PROBLEM SOLVING ABILITY AMONG NURSING STUDENTS IN KSA

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ABSTRACT

Background

Over the past ten years, critical thinking became a required learning outcome for national accreditation of nursing education programs, yet there is still lack of consensus in regard to what critical thinking is in nursing, and very little formal research has been done to determine which teaching methodologies improve critical thinking in nursing students. Nurse education may be significantly improved if new teaching practices are introduced.

Aim of the Study: To investigate the efficacy of Problem Based Learning (PBL) on nursing students in enhancing their critical thinking and problem solving ability with that of lecture method.

Materials & Methods: Quasi Experimental study with control group, pre test and post test design has been adopted for this study.

Setting of the Study: The study was conducted at MAJMAAH University in Saudi Arabia which is affiliated to Ministry of Higher Education (MOHE), Kingdom of Saudi Arabia.

Population: All the II year B.S.N students from the selected University. **Sample:** Simple random sampling method was used for the study. The sample size was 60, out of which 30 were allotted to the interventional group and the remaining 30 were allotted to the control group.

Results: Both experimental group and control group were showing significant improvement in their critical thinking skills and problem solving abilities with the 'p' value of 0.0001 for the experimental group and 0.003 for the control group. However when we compare the post test standard deviation of both groups, experimental group scored higher than the control group which indicates that the PBL method was found to be more effective than Lecture method in improving the critical thinking skills and problem solving ability of nursing students. **Conclusion:** - PBL is a potentially powerful and essential approach to promote quality in nursing practice, which is dependent upon the educational preparation of nurses think critically and solve problems.

KEYWORDS: Problem Based Learning, Lecture Method, Critical Thinking, Problem Solving Ability, Nursing Students

INTRODUCTION

Health care Organizations have made dramatic advances and transformations during the last decades, resulting in technology and theory (Miller M, Malcolm N. 1990). No thoughtful person can be appeared in a society in which educational system accepts the problems uncritically (Heravi M, Milani M, et.al. 2004). In today's fast paced,

technologically advanced world, the challenge for nursing faculty is to teach students critical thinking (CT) skills and the ability to practice competently in a variety of situations. The rapidly changing nature of the health care system presents nurses with varied complex practice issues with no clear solutions. These health care problems require nursing students and nurses to have CT skills. (Bambini D, Washburn J, et al. 2009)

Educators have to equip nursing students with skills that promote their CT to solve complex issues. The development of CT skills requires students to engage in discussions to become active participants in their own learning (Bucy M. C. 2006). Education with an active learning will result in significant increase between the education and medical practice. (Creedy D, Horsfall J, et al.1999). Nurses use information from nursing practice. Nursing theory and other sciences to apply knowledge to individual situations. Nurses need to be prepared for lifelong learning (Schank M. 1990 & Meyers ST, Stolte KM, et al.1991) and the future nursing profession is going to recognize a graduate who can think critically and identify complex clinical phenomena. (Knowles M.1980).

Need for the Study

Over the past ten years, critical thinking became a required learning outcome for national accreditation of nursing education programs, yet there is still lack of consensus in regard to what critical thinking is in nursing, and very little formal research has been done to determine which teaching methodologies improve critical thinking in nursing students. Teaching methodologies used to promote critical thinking needs to be investigated to enhance the delivery of safe and effective care to improve student success on the NCLEX-RN Exam.

Unfortunately, traditional undergraduate exercise science courses using lecture based instructions are often content driven, emphasizing abstract concepts over concrete examples and application. Information heavy presentation within a lecture likely results in students cramming to simply memorize information in order to pass examinations. Such instructional methods may not result in long-term knowledge retention (Beers G.W. 2005).

Active learning is usually enjoyable, motivational and effective, and retention of knowledge is perceived to be increased. (Petress K. 2008). According to Kane, it is satisfying for educators to think that students might enjoy themselves while being engaged in their learning, as they learn something useful. Recent trends in education point to a shift from a traditional paradigm of teacher-directed and traditional lecture format to a learning paradigm of self directed interactive learning (Jeffries P. 2000). Along with self directed learning, the development of critical thinking and problem solving skills is the main goal of Problem-based learning (PBL). PBL affords an environment conducive to teaching and learning critical thinking skills.

There is some evidence to suggest that medical students following PBL curricula are better disposed towards research (Khan H, Taqui AM, et al. 2007) and show significant improvements in preventive care and diagnostic performance in practice after graduation (Tamblyn R, Abrahamowicz M, et al. 2005). PBL is an educational tool that has been widely used in medical education to introduce learners to independent problem solving.

In a study comparing PBL with conventional lecture approaches, the PBL students rated themselves higher as a measure of clinical problem solving ability (Siu H, Laschinger H, et al. 2005). Nurse education may be significantly improved if new teaching practices are introduced. Moreover, the integration of PBL into clinical practice for nurses as an effective educational methodology allows nurses to achieve best practice outcomes based on real-life clinical problems, thus linking research evidence to nursing practice.

Aims & Objectives

- To assess the pre test and post test level of critical thinking skills and problem solving ability of nursing students among the control and the interventional group.
- To determine the effectiveness of PBL on critical thinking skills and problem solving ability of nursing students.
- To assess the students' perception on the influence of PBL on their critical thinking skills and problem solving ability in interventional group.
- To associate the level of critical thinking skills and the problem solving ability of both the groups with selected demographic variables.

Hypothesis

H1 - There is a significant difference between the pre test and post test level of critical thinking skills and problem solving ability of nursing students in the interventional group.

H2 - There is a significant difference in the post test level of critical thinking skills and problem solving ability of nursing students between the control group and the experimental group.

Limitations

This study was limited to:-

- Only II year (3rd and 4th level) B.S. Nursing students studying at Maj maah University, Saudi Arabia.
- The responses elicited through the structured questionnaire.
- Evaluating the effectiveness of PBL only in terms of critical thinking skills and problem solving ability.
- Only one topic (Diabetes mellites) in Adult & Geriatric Health Nursing – I was covered.

MATERIALS AND METHODS

Research Approach: Quantitative approach **Research Design:** Quasi Experimental study with control group, pre test and post test design has been adopted for this study. **Setting of the study:** The study was conducted at MAJMAAH University in Saudi Arabia which is affiliated to Ministry of Higher Education (MOHE), Kingdom of Saudi Arabia. **Population:** All the II year B.S.N students from the selected University. **Sample:** Simple random sampling method was used for the study. The sample size was 60, out of which 30 were allotted to the interventional group and the remaining 30 were allotted to the control group.

Description of the Instrument

Part 1: Multiple choice questionnaires on Diabetes mellites which consists of 40 questions to assess critical thinking skills and problem solving ability of nursing students. It has 5 sections (Knowledge, Comprehension, Application, Analysis, and Synthesis) and each section has 8 questions. The resulting score was interpreted as follows:

1 – 25% - Low skill, 26 – 50% - Moderate skills, 51 – 75% - High skills and 76 – 100% - Excellent skills

Part 2: Five point Likert scale was used to assess the perceived benefits of PBL on Critical thinking skills and

problem solving ability. It consisted of 40 statements. The score was interpreted as follows:

Strongly agree – 5, agree – 4, Uncertain – 3, Disagree – 2, strongly disagree –1.

Data Collection Procedure

After obtaining necessary permission and consent, samples were allotted to Interventional group and control group using simple random sampling. Control group was taught on diabetes mellites using traditional lecture method as a routine method of teaching. Pre test and post test were done using the same tool.

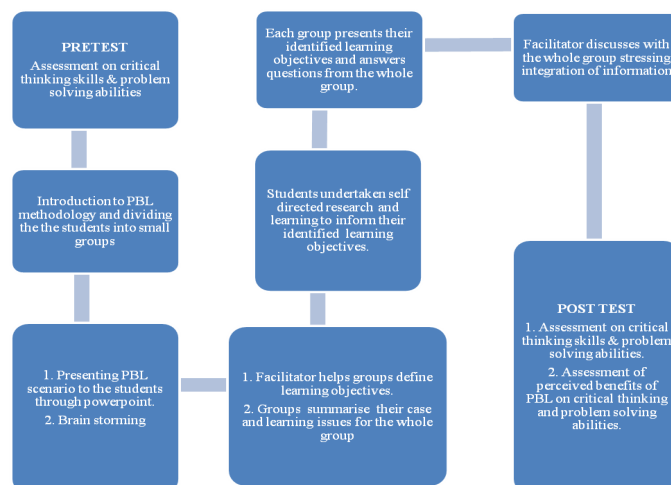


Figure 1: PBL Methodology Administered to the Interventional Group

FINDINGS & DISCUSSIONS

Table 1: Frequency and Percentage Distribution of Demographic Variables among Nursing Students in Experimental and Control Groups

Demographic Variables		Experimental Group		Control Group	
		Frequency	Percentage	Frequency	Percentage
Age	20-21 years	21	70.0	21	70.0
	22-23 years	6	20.0	6	20.0
	24 & above	3	10.0	3	10.0
Gender	Male	15	50.0	15	50.0
	Female	15	50.0	15	50.0
Level	3rd level	7	23.3	7	23.3
	4th level	23	76.7	23	76.7
Residence	urban	13	43.3	14	46.7
	Rural	13	43.3	12	40.0
	Sub urban	4	13.3	4	13.3
Medium of language	Arabic	18	60.0	20	66.7
	English	12	40.0	10	33.3
Marks in +2	61-80%	12	40.0	10	33.3
	more than 80%	18	60.0	20	66.7
Aptitude towards nursing	self interest	27	90.0	28	93.3
	friends	2	6.7	1	3.3
	Any other	1	3.3	1	3.3
Marks in 1 st year	less than 40%	1	3.3	1	3.3
	41-60%	4	13.3	5	16.7
	61-80%	16	53.3	15	50.0
	more than 80%	9	30.0	9	30.0
Parent educational status	Primary	3	10.0	3	10.0
	secondary	18	60.0	16	53.3
	collegiate	9	30.0	11	36.7

Statistically no significant difference was found in the distribution of demographic variables among the nursing students in experimental and control groups.

Table 2: Comparison of Pre Test and Post Test Level of Critical Thinking Skills and Problem Solving Abilities between Control and Experimental Group

Si. No	Level of Critical Thinking	Experimental Group				Control Group			
		Pre Test		Post Test		Pre Test		Post Test	
		F	%	F	%	F	%	F	%
1	Low	27	90	0	0	29	96.7	0	0
2	Moderate	3	10	9	30	1	3.3	30	100
3	High	0	0	20	66.7	0	0	0	0
4	Excellent	0	0	1	3.3	0	0	0	0

It was observed in table 2 that none of the students had either high level or excellent level of critical thinking and problem solving skills in both groups in the pre test. However in the post test, in control group all the 30 (100%) had moderate level and none of them had high or excellent level of critical thinking & problem solving skills where as in Experimental group most of them 21(70%) had high and excellent level and only 9 (30%) of the students had moderate level of critical thinking and problem solving skills. This showed that the PBL method had improved the level of critical thinking skills and problem solving ability of nursing students. The findings are supported by the study conducted by **Sendaq and Odabas.(2009)** who used an exact instrument in measuring students' critical thinking changes in Problem Based Learning experiment. They found that the students in PBL approach shows increased level of critical thinking ability compared to the students in the traditional learning approach. Similarly a longitudinal study conducted in Hong Kong University under graduate nursing students by **Tiwari et al.(2006)** also supported the present study. He compared the effects of PBL and traditional learning approach on students' critical thinking ability and reported that the students in PBL had improved their critical thinking skills throughout the three years of the study.

Table 3: Level of Critical Thinking Abilities in Each Domain for Experimental and Control Group

Si. No	Domain Description	Experimental Group				Control Group			
		Pre Test		Post Test		Pre Test		Post Test	
		Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
1	Knowledge	2.63	1.38	6.87	0.68	2.03	1.05	6.9	0.31
2	Comprehension	1.97	1	5.13	1.78	1.97	0.93	4.77	0.43
3	Application	2.3	1.37	6.53	2.22	1.77	1.07	5	0.26
4	Analysis	1.73	1.72	5.47	1.72	0.87	0.86	3.47	1.38
5	Synthesis	1.07	1.7	4.4	1.38	2.13	2.1	4.87	0.35

While comparing the students' critical thinking abilities in all the domains in pre test and post test of both experimental and control groups, it is noted that the mean scores had increased in the post test in all the domains. This showed that both Problem solving method and Lecture method helped in improving their critical thinking abilities. As they are growing children in learning stage, they try to take benefit from any learning measures which are introduced to them. However while we consider the standard deviation between pre and post test of both groups, experimental group has showed high difference than the control group. Moreover, when we analyze the results based on domains, the students' mean score in knowledge domain was high in the post test of both groups which showed that both PBL and Lecture methods were effective in improving the knowledge level of the students.

Table 4: Comparison of Effectiveness of PBL on Critical Thinking Skills and Problem Solving Ability between Experimental Group and Control Group among Nursing Students

Groups	Pre Test		Post Test		T Test Among Groups
	Mean	Std Dev	Mean	Std Dev	
Experimental	9.76	4.3	28.4	4.11	t=6.2,df=29,p=0.0001 Highly significant
Control	8.76	3.62	25.03	1.99	t=3.2, df= 29, p=0.003, Highly significant
T test(Within the group)	T=0.33,df=58 P=0.73	NS	t=0.0001, df=58,p=0.99	NS	

From table 4, it is noted that the mean pre test score for experimental group was 9.76 and for the control group it was 8.76 where as in the post test the mean was 28.4 for experimental group and 25.03 for control group. Moreover from the 't' test we could see that both the methods were highly significant in improving their critical thinking skills and problem solving abilities with the 'p' value of 0.0001 and 0.003 for the experimental group and control group respectively. However when we compare the post test standard deviation of both groups, experimental group showed high score (4.11) and the control group showed low score (1.99) which indicates that compared to the lecture method with PBL method, the later method shows more effective than the former method. The result of this study is consistent with those of previous study done by **Koleini et al** who reported that there was a significant difference between the traditional based learning and PBL in that the PBL may lead to better learning than to the lecture method.

Level of Perceived Benefit of PBL between Experimental Group and Control Group

In the study while analysing the perceived benefits of PBL method of Experimental group, it was found that most of the students 28 (93.33%) had favourable perception towards PBL method and only 2 (6.67%) had unfavourable perception. This result was supported by the study done by **Marytyn P Kingsbury and Joanne S Lynn 2008**, who found that the overall students' response to PBL method was overwhelmingly positive with 82% positively agreeing that they were interested in the subject matter. Furthermore, there was a positive correlation between students 'enjoyment of this clustered PBL format and various measures of tutor 'effectiveness'. Similar finding is observed in a study done by **Agnes Tiwari, Patric Lai, et al 2006**. Findings of their study revealed differences in the students' perceptions of their learning experiences, with the PBL students reporting active participation during the learning process and Lecture students reporting passive listening. The PBL students found the experience enjoyable, inspiring and self –fulfilling; the opposite was expressed by the lecture students, who were quite negative about their learning experience.

Table 5: Association between the Level of Critical Thinking Skills and Problem Solving Abilities in the Post Test of Experimental Group with Their Selected Demographic Variables

Demographic Variable		Level		Chi Square
		Excellent	High	
level	3rd level	2	5	x ² =0.93 df=1 p=0.57 NS
	4th level	8	15	
residence	urban	6	7	x ² =3.0 df=2 p=0.22 NS
	Rural	4	9	
	Sub urban	0	4	
medium of language	Arabic	7	11	x ² =0.62 df=1 p=0.42 NS
	English	3	9	
% of marks in +2	61-80%	4	8	-
	more than 80%	6	12	
Aptitude towards nursing	self interest	10	17	x ² =1.66 df=2 p=0.43 NS
	friends	0	2	
	Any other	0	1	
marks in 1 st year	Less than 40%	0	1	x ² =3.12 df=3 p=0.37 NS
	41-60%	1	3	
	61-80%	4	12	
	more than 80%	5	4	
Parent's education	Primary	1	2	x ² =0.75 df=2 p=0.68 NS
	Secondary	7	11	
	Collegiate	2	7	

Table 5 showed that there was no significant association between the critical thinking skills and problem solving abilities in post test of Experimental group with their selected demographic variables.

RECOMMENDATIONS

- The study can be replicated in a larger sample size.
- A similar study can be conducted in other Universities of Saudi Arabia.
- Longitudinal studies can be done to provide a profile of students' development of approaches to learning over time in order to assess the enduring effect of PBL.
- PBL should be introduced into nursing curriculum in order to promote critical thinking skills and problem solving ability among nursing students.

CONCLUSIONS

In the light of the findings, there is a positive effect on the influence of PBL in enhancing critical thinking skills and problem solving ability among nursing students. It offers several advantages over traditional lecture methods. It is based on principles of adult learning theory, including motivating the students, encouraging them to set their own learning objectives, and giving them a role in decisions that affect their own learning. So it was concluded that PBL is a potentially powerful and essential approach to promote quality in nursing practice, which is dependent upon the educational preparation of nurses think critically and solve problems.

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